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APPLICATION NO.	FILING DATE	FIRST NAMED INVENTOR	ATTORNEY DOCKET NO.	CONFIRMATION NO.
09/686,408	10/11/2000	LI YANG	791_119	6047

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EXAMINER

CANTELMO, GREGG

ART UNIT	PAPER NUMBER
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1745

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DATE MAILED: 05/01/2002

Please find below and/or attached an Office communication concerning this application or proceeding.

Office Action Summary

Application No.

09/686,408

Applicant(s)

YANG ET AL.

Examiner

Gregg Cantelmo

Art Unit

1753

-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address --
Period for Reply

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE 3 MONTH(S) FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If the period for reply specified above is less than thirty (30) days, a reply within the statutory minimum of thirty (30) days will be considered timely.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133).
- Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

Status

- 1) ☐ Responsive to communication(s) filed on _____.
- 2a) ☐ This action is **FINAL**. 2b) ☒ This action is non-final.
- 3) ☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

Disposition of Claims

- 4) ☒ Claim(s) 1-10 is/are pending in the application.
- 4a) Of the above claim(s) _____ is/are withdrawn from consideration.
- 5) ☐ Claim(s) _____ is/are allowed.
- 6) ☒ Claim(s) 1-10 is/are rejected.
- 7) ☐ Claim(s) _____ is/are objected to.
- 8) ☐ Claim(s) _____ are subject to restriction and/or election requirement.

Application Papers

- 9) ☒ The specification is objected to by the Examiner.
- 10) ☒ The drawing(s) filed on 11 October 2000 is/are: a) ☒ accepted or b) ☐ objected to by the Examiner.
- Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).
- 11) ☐ The proposed drawing correction filed on _____ is: a) ☐ approved b) ☐ disapproved by the Examiner.
- If approved, corrected drawings are required in reply to this Office action.
- 12) ☐ The oath or declaration is objected to by the Examiner.

Priority under 35 U.S.C. §§ 119 and 120

- 13) ☒ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).
- a) ☒ All b) ☐ Some * c) ☐ None of:
1. ☒ Certified copies of the priority documents have been received.
2. ☐ Certified copies of the priority documents have been received in Application No. _____.
3. ☐ Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).
- * See the attached detailed Office action for a list of the certified copies not received.
- 14) ☐ Acknowledgment is made of a claim for domestic priority under 35 U.S.C. § 119(e) (to a provisional application).
- a) ☐ The translation of the foreign language provisional application has been received.
- 15) ☐ Acknowledgment is made of a claim for domestic priority under 35 U.S.C. §§ 120 and/or 121.

Attachment(s)

- 1) ☒ Notice of References Cited (PTO-892)
- 2) ☐ Notice of Draftsperson's Patent Drawing Review (PTO-948)
- 3) ☒ Information Disclosure Statement(s) (PTO-1449) Paper No(s) 2 and 4.
- 4) ☐ Interview Summary (PTO-413) Paper No(s). _____.
- 5) ☐ Notice of Informal Patent Application (PTO-152)
- 6) ☐ Other: _____.

DETAILED ACTION

Priority

1. Receipt is acknowledged of papers submitted under 35 U.S.C. 119(a)-(d), which papers have been placed of record in the file.

Information Disclosure Statement

2. The information disclosure statements filed October 11, 2000 and December 1, 2000 have been placed in the application file and the information referred to therein have been considered as to the merits.

Drawings

3. The drawings received October 11, 2000 are acceptable for examination purposes.

Specification

4. The title of the invention is not descriptive. A new title is required that is clearly indicative of the invention to which the claims are directed.

The following title is suggested: Lithium secondary battery with the non-aqueous electrolyte having restricted concentration of water and hydrofluoric acid.

Claim Rejections - 35 USC § 112

5. The following is a quotation of the second paragraph of 35 U.S.C. 112:

The specification shall conclude with one or more claims particularly pointing out and distinctly claiming the subject matter which the applicant regards as his invention.

6. Claim 5-8 are rejected under 35 U.S.C. 112, second paragraph, as being indefinite for failing to particularly point out and distinctly claim the subject matter which applicant regards as the invention.

7. The term "highly graphitized" in claims 5-8 is a relative term which renders the claims indefinite. The term "highly graphitized" is not defined by the claim, the specification does not provide a standard for ascertaining the requisite degree, and one of ordinary skill in the art would not be reasonably apprised of the scope of the invention. The specification teaches of examples of highly graphitized carbon at page 11, lines 8-10 but fails to provide clear definition of the term "highly graphitized". One of ordinary skill in the art would not have been appraised of all forms of carbon which the instant application appreciated as highly graphitized at the time the claimed invention was made. Furthermore advances in carbon powder used in these batteries, may alter the degree of graphitization which is understood as being "highly" graphitized.

Claim Rejections - 35 USC § 102

8. The following is a quotation of the appropriate paragraphs of 35 U.S.C. 102 that form the basis for the rejections under this section made in this Office action:

A person shall be entitled to a patent unless –

(b) the invention was patented or described in a printed publication in this or a foreign country or in public use or on sale in this country, more than one year prior to the date of application for patent in the United States.

9. Claims 1, 2 and 9 are rejected under 35 U.S.C. 102(b) as being anticipated by JP 10 116 631 A (JP '631).

JP '631 discloses a lithium secondary battery comprising: an electrode body having a positive electrode 5 and a negative electrode 4 disposed about opposite sides of separator 3 (Fig. 1). While the language of winding or laminating is a process step and not held to further limit the end product, the electrode body as shown in Fig. 1 is wound (see page 10 of the uncertified translation of JP '631, in particular paragraph [0077]); a non-aqueous electrolytic solution containing a lithium salt (lithium compound) wherein the electrolytic solution contains water and hydrofluoric acid in a total maximum concentration of 150 ppm or less (abstract as applied to claim 1).

The lithium compound is LiPF₆ (page 3 of translation, paragraph [0027] as applied to claim 2).

Since the prior art product has the same structure and reduced levels of water and HF in the electrolytic solution, as recited in claim 1, it is expected that the capacity of the battery will be 2 Ah or more.

Where the claimed and prior art products are identical or substantially identical in structure or composition, or are produced by identical or substantially identical processes, a prima facie case of either anticipation or obviousness has been established. In re Best, 562 F.2d 1252, 1255, 195 USPQ 430, 433 (CCPA 1977). "When the PTO shows a sound basis for believing that the products of the applicant and the

prior art are the same, the applicant has the burden of showing that they are not." In re Spada, 911 F.2d 705, 709, 15 USPQ2d 1655, 1658 (Fed. Cir. 1990). Therefore, the prima facie case can be rebutted by evidence showing that the prior art products do not necessarily possess the characteristics of the claimed product. In re Best, 562 F.2d at 1255, 195 USPQ at 433. See also Titanium Metals Corp. v. Banner, 778 F.2d 775, 227 USPQ 773 (Fed. Cir. 1985). See also MPEP § 2112.01 (as applied to claim 9).

Claim Rejections - 35 USC § 103

10. The following is a quotation of 35 U.S.C. 103(a) which forms the basis for all obviousness rejections set forth in this Office action:

(a) A patent may not be obtained though the invention is not identically disclosed or described as set forth in section 102 of this title, if the differences between the subject matter sought to be patented and the prior art are such that the subject matter as a whole would have been obvious at the time the invention was made to a person having ordinary skill in the art to which said subject matter pertains. Patentability shall not be negated by the manner in which the invention was made.

11. Claims 3 and 4 rejected under 35 U.S.C. 103(a) as being unpatentable over JP '631 in view of U.S. patent No. 5,807,646 (Iwata).

The teachings of claims 1 and 2 have been discussed above and are incorporated herein.

The difference between the instant claims and JP '631 is that JP '631 does not appear to disclose lithium manganese oxide of cubic system spinel structure containing lithium and manganese as the main components used as the positive electrode active substance (as recited in both claims 3 and 4).

The use of lithium manganese oxide materials as the positive electrode active substance is well described in the art.

The lithium-manganese oxide material is of high performance from the viewpoint of electrochemistry because of its increased discharge capacity and high stability in discharge capacity after repeated charge/discharge cycles, when used as an active material for a positive electrode in lithium secondary batteries. When the lithium-manganese oxide of the invention is used as an active material for a positive electrode in a lithium secondary battery, it is possible to operate the battery in an output voltage range as high as from 3.5 volts to 4.5 volts with an increased discharge capacity and a high stability in discharge capacity even after repeated charge/discharge cycles. These advantages have not been achieved by conventional Li--Mn oxides. It should also be appreciated that the present Li--Mn oxide can be packed efficiently so that this could lead to a lithium secondary battery having a relatively high capacity (Iwata, col. 15, ll. 4-30; as applied to claims 3 and 4).

The motivation for selecting the positive electrode active material to be lithium manganese oxide of cubic system spinel structure containing lithium and manganese as the main components is that it has increased discharge capacity and high stability in discharge capacity after repeated charge/discharge cycles, when used as an active material for a positive electrode in lithium secondary batteries.

Therefore it would have been obvious to one of ordinary skill in the art at the time the claimed invention was made to modify the teachings of JP '361 by selecting the positive electrode active material to be lithium manganese oxide of cubic system spinel

structure containing lithium and manganese as the main components since it would have manufactured a battery having increased discharge capacity and high stability in discharge capacity after repeated charge/discharge cycles, when used as an active material for a positive electrode in lithium secondary batteries.

Furthermore, the selection of a known material based on its suitability for its intended use supported a prima facie obviousness determination in *Sinclair & Carroll Co. v. Interchemical Corp.*, 325 U.S. 327, 65 USPQ 297 (1945) See also *In re Leshin*, 227 F.2d 197, 125 USPQ 416 (CCPA 1960). MPEP § 2144.07.

12. Claims 5 and 6 are rejected under 35 U.S.C. 103(a) as being unpatentable over JP '361 in view of U.S. patent No. 5,792,577(Ejiri).

The teachings of claims 1 and 2 have been discussed above and are incorporated herein.

The difference between the instant claims and JP '631 is that JP '631 does not appear to disclose using highly graphitized carbon fiber as the negative electrode active substance (as recited in each of claims 5 and 6).

Use of highly graphitized carbon fibers in negative electrodes is desired due to graphite's large charge and discharge capacities (Ejiri col. 5, line 54 through col. 6, line 5). Furthermore, Ejiri discloses that the graphitized carbon negative electrode can be employed in a lithium secondary battery wherein the lithium electrolyte is LiPF₆ and the positive electrode is LiMnO (col. 14, ll. 65 through col. 15, line 10).

The motivation for using highly graphitized carbon fiber as the negative electrode active substance is that it would have provided a negative electrode having improved charge and discharge capacities.

Therefore it would have been obvious to one of ordinary skill in the art at the time the claimed invention was made to modify the teachings of JP 361 by using highly graphitized carbon fiber as the negative electrode active substance since it would have provided a negative electrode having improved charge and discharge capacities.

13. Claims 7 and 8 are rejected under 35 U.S.C. 103(a) as being unpatentable over JP '361 in view of Iwata as applied to claims 1-4 above and in further view Ejiri.

The teachings of claims 1-4 have been discussed above and are incorporated herein.

The difference between the instant claims and JP '631 is that JP '631 does not appear to disclose using highly graphitized carbon fiber as the negative electrode active substance (as recited in each of claims 7 and 8).

Use of highly graphitized carbon fibers in negative electrodes is desired due to graphite's large charge and discharge capacities (Ejiri col. 5, line 54 through col. 6, line 5). Furthermore, Ejiri discloses that the graphitized carbon negative electrode can be employed in a lithium secondary battery wherein the lithium electrolyte is LiPF₆ and the positive electrode is LiMnO (col. 14, ll. 65 through col. 15, line 10).

The motivation for using highly graphitized carbon fiber as the negative electrode active substance is that it would have provided a negative electrode having improved charge and discharge capacities.

Therefore it would have been obvious to one of ordinary skill in the art at the time the claimed invention was made to modify the teachings of JP 361 by using highly graphitized carbon fiber as the negative electrode active substance since it would have provided a negative electrode having improved charge and discharge capacities.

14. Claim 10 is rejected under 35 U.S.C. 103(a) as being unpatentable over JP '361 in view of U.S. patent No. 5,709,968 (Shimizu) or U.S. patent No. 6,053,953 (Tomiyaama).

The teachings of claims 1 and 2 have been discussed above and are incorporated herein.

The difference between the instant claims and JP '631 is that JP '631 does not appear to disclose using the battery in an electric automobile or hybrid electric automobile.

It is noted that the claimed invention is drawn to a lithium secondary battery and that the limitations of claim 10 do not further limit the structure of the battery but is rather an intended use for the battery of claim 1 in automobiles.

Use of lithium batteries in automobiles, electric automobiles is described in the art as shown by either Shimizu or Tomiyama.

A lightweight, large capacity, long-life and low cost secondary battery can be provided. Moreover, since the battery exhibits excellent safety and reliability, it can be used widely for, for example, a portable unit, a battery for a bicycle, an electric automobile, road leveling and the like. Thus, significantly multi-purpose characteristic can be obtained (Shimizu, col. 19, ll. 12-18).

Tomiyama is drawn to lithium secondary batteries wherein the electrolyte can be a lithium compound, lithium hexafluorophosphate (col. 15 ll. 25-42). The battery of Tomiyama can further be employed in automobiles or electric vehicles (col. 18, ll. 48-50).

The motivation for using the battery of JP '361 in an electric automobile is that it would have provided a power source to the electric automobile which has a long-life and is portable and reliable.

Therefore it would have been obvious to one of ordinary skill in the art at the time the claimed invention was made to modify the teachings of JP '361 since it is known to use lithium secondary batteries in electric vehicles since they would have fabricated a powered vehicle having a long-life, portable and reliable power source.

15. Claim 10 is rejected under 35 U.S.C. 103(a) as being unpatentable over U.S. patent No. 6,053,953 (Tomiyama) in view of JP '361.

Tomiyama is drawn to lithium secondary batteries wherein the electrolyte can be a lithium compound, lithium hexafluorophosphate (col. 15 ll. 25-42). The battery of Tomiyama can further be employed in automobiles or electric vehicles (col. 18, ll. 48-50 as applied to claim 10).

The difference between the instant claims and Tomiyama is that Tomiyama does not disclose the lithium battery having a non-aqueous electrolytic solution containing a lithium compound wherein the solution contains water and hydrofluoric acid in a total concentration of 10,000 ppm or less.

The motivation for using the battery of JP '361 in an electric automobile is that it would have provided a lithium secondary battery having reduced water and hydrofluoric acid and have high capacity and excellent charge and discharge characteristics.

Therefore it would have been obvious to one of ordinary skill in the art at the time the claimed invention was made to modify the teachings of Tomiyama by using the battery configuration of JP '361 since it would have provided a lithium secondary battery having reduced water and hydrofluoric acid and have high capacity and excellent charge and discharge characteristics.

Double Patenting

16. The nonstatutory double patenting rejection is based on a judicially created doctrine grounded in public policy (a policy reflected in the statute) so as to prevent the unjustified or improper timewise extension of the "right to exclude" granted by a patent and to prevent possible harassment by multiple assignees. See *In re Goodman*, 11 F.3d 1046, 29 USPQ2d 2010 (Fed. Cir. 1993); *In re Longi*, 759 F.2d 887, 225 USPQ 645 (Fed. Cir. 1985); *In re Van Ornum*, 686 F.2d 937, 214 USPQ 761 (CCPA 1982); *In re Vogel*, 422 F.2d 438, 164 USPQ 619 (CCPA 1970); and, *In re Thorington*, 418 F.2d 528, 163 USPQ 644 (CCPA 1969).

A timely filed terminal disclaimer in compliance with 37 CFR 1.321(c) may be used to overcome an actual or provisional rejection based on a nonstatutory double patenting ground provided the conflicting application or patent is shown to be commonly owned with this application. See 37 CFR 1.130(b).

Effective January 1, 1994, a registered attorney or agent of record may sign a terminal disclaimer. A terminal disclaimer signed by the assignee must fully comply with 37 CFR 3.73(b).

17. Claims 1-10 are provisionally rejected under the judicially created doctrine of obviousness-type double patenting as being unpatentable over claims 1-8 and 12 of copending Application No. 09/770,725 in view of either JP '361, DE 198 27 631 A1 (DE '631), or WO 99/34471 (WO '471).

For claim review purposes, the examiner has cited U.S. patent Application Publication No. US 2001/0016291 A1 which is the published application of copending Application No. 09/770,725.

Copending Application No. 09/770,725 claims a lithium secondary battery comprising: an electrode unit produced by winding or laminating a positive electrode and a negative electrode via a separator, and a non-aqueous electrolytic solution containing a lithium compound as an electrolyte (copending claim 1 as applied to claim 1).

The lithium compound is lithium hexafluorophosphate (copending claim 2 as applied to claim 2).

A lithium manganese oxide containing lithium and manganese as the main components and having a cubic system spinel structure is used as the positive electrode (copending claims 3 and 4 as applied to instant claims 3 and 4).

A highly graphitized carbon fiber filler is used as the negative electrode active substance (copending claims 5-7 as applied to instant claims 5-8).

The lithium secondary battery has a battery capacity of 2 Ah or more (copending claim 8 as applied to claim 9).

The battery is used in an electric automobile or a hybrid electric automobile (copending claim 12 as applied to claim 10).

The difference between the instant claims and copending claim 1 is that the copending claim 1 does not recite that the non-aqueous electrolytic solution containing

Art Unit: 1745

a lithium salt (lithium compound) wherein the electrolytic solution contains water and hydrofluoric acid in a total maximum concentration of 10,000 ppm or less.

The concept of reducing the water and hydrogen fluoride concentration in a non-aqueous electrolytic solution of a lithium secondary battery is well documented in the art as shown by either JP '361, DE '631 or WO '471.

More particularly JP '361 discloses of a non-aqueous electrolytic solution having a maximum water and HF (hydrofluoric acid) concentration of 150 ppm or less (abstract). DE '631 similarly discloses removing water and hydrogen fluoride from the non-aqueous electrolytic solution to a water concentration of less than 10 ppm and an HF acid concentration less than 30 ppm (abstract). And further WO '471 discloses of removing water and hydrogen fluoride from the non-aqueous electrolytic solution to a water concentration of not more than 3 ppm and an acid level of not more than 1 ppm (abstract),

Each of these references recognized that the battery charge and discharge capacity is improved when the water and acid content is reduced in the electrolytic solution (JP '361 abstract; DE '631 abstract WO '471 abstract).

The motivation for reducing the water and HF content in copending Application No. 09/770,725 is to improve the charge and discharge capacity of the battery.

Therefore it would have been obvious to one of ordinary skill in the art at the time the claimed invention was made to modify the claims of copending Application No. 09/770,725 by selecting the electrolytic solution to have water and HF in a total

Art Unit: 1745

concentration of 10,000 ppm or less since it would have improved the charge and discharge capacity of the battery.

This is a provisional obviousness-type double patenting rejection.

Conclusion

18. The prior art made of record and not relied upon is considered pertinent to applicant's disclosure. USPAT 6,001,325 and 6,033,808 (both to Salmon et al.) teach of non-aqueous lithium electrolyte solutions wherein the salt should be free of water and HF (col. 2, ll. 1-8). USPAT 6,197,205 (Tsujioka et al.) discloses a lithium electrolytic solution having reduced HF concentration (reference to the various examples of this prior art reference).

19. Any inquiry concerning this communication or earlier communications from the examiner should be directed to Gregg Cantelmo whose telephone number is (703) 305-0635. The examiner can normally be reached on Monday through Thursday from 8:00 a.m. to 5:30 p.m. If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, Pat Ryan, can be reached on (703) 308-2383. FAX communications should be sent to the appropriate FAX number: (703) 872-9311 for After Final Responses only; (703) 872-9310 for all other responses. FAXES received after 4 p.m. will not be processed until the following business day. Any inquiry of a general nature or relating to the status of this application or proceeding should be directed to the receptionist whose telephone number is (703) 308-0661.

gc

April 25, 2002


Patrick Ryan
Supervisory Patent Examiner
Technology Center 1700